DOCUMENT RESUME

ED 481 232 CS 512 416

AUTHOR	Smith, Carl B., Ed.
TITLE	Student Research Skills and Techniques. ERIC Topical Bibliography and Commentary.
INSTITUTION	ERIC Clearinghouse on Reading, English, and Communication, Bloomington, IN.
SPONS AGENCY	Institute of Education Sciences (ED), Washington, DC.
REPORT NO	TBC-03001
PUB DATE	2003-09-00
NOTE	6p.
CONTRACT	ED-99-CO-0028
AVAILABLE FROM	ERIC Clearinghouse on Reading, English and Communication, 2805 E. 10th St. # 140, Bloomington, IN 47408-2698. Web site: http://eric.indiana.edu.
PUB TYPE	ERIC Publications (071) -- Reference Materials - Bibliographies (131)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Bibliographies; Higher Education; *Research Methodology; *Research Skills; Student Developed Materials; Student Projects; *Student Research

ABSTRACT

Many methods of student-conducted research exist. Within these methods, four stages are evident: Presearch, Search, Interpret, and Report. This topical bibliography and commentary delineates and discusses each of these specific stages in turn. The bibliography/commentary points out that students can best learn about conducting research by having clear-cut guidelines, being shown how to perform each step from start to finish, having the opportunity to confer with peers and teachers on their progress, and having each step broken down into smaller, more manageable tasks. It also enumerates six practical ideas a teacher can implement, which can lead to a more expressive approach to doing research. (Contains 4 Internet addresses and 12 references.) (NKA)

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TBC-03001

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Introduction

Many methods of student-conducted research exist. Within these methods, four stages are evident (Barkley & Traser, 1999; Bryan, 1998; California Media and Library Educators Association, 1994; Dreher, Davis, Waynant, & Clewell, 1997; Duffield, 1998; Eisenberg & Berkowitz, 1990; Gordon, 2002; Kuhlthau, 1994; Lane, Chisholm, & Mateer, 2000; Stripling & Pitts, 1988): Presearch, Search, Interpret, and Report. In this paper, the specific steps in each stage will be presented and discussed.

Presearch

The goal in this stage is to define the research topic. The steps needed to reach this goal are to formulate the research questions, form a search strategy, have an understanding of the finished report format, and evaluate to see if the products of the previous steps will lead to the desired outcome.

Research Questions

The purpose of this step is to narrow down what the researcher is looking for. One way to complete this step is to use the K-W-L system: (What I Know, What I Want to Learn, What I Learned). Have the students list everything that they Know about the topic. Then have the students explore what they Want to learn based on what they know. Asking "what", "where", "when", "how" to the already known information will help generate this list. Have students write down their questions in a semantic map and use crayon to circle each question in a different color. These will become paragraphs in the report.

Search Strategy

Have the students develop a resource list Where they can find the answers to their questions. Some of these resources may be an encyclopedia, a professional in the field of interest, the library, the Internet, or through developing and conducting a scientific experiment.

Report Format

Students need to be shown how to present the data they collect. Some ways to present data are a formal written paper, a poster presentation, teaching a lesson to the class, a wall poster, a science project, or a script for a fact-based play. The possibilities are limited only by the creativity of the teacher. Students need to have an understanding of the grading criteria for their report. Topics to address are the importance of grammar and spelling, the minimum or maximum number of citations required, the total length of the project, and any other criteria deemed important by the teacher.

Evaluate

The evaluation step is important in making sure the information in the previous steps is pointing the student in the correct direction to obtain the desired results. If the search strategies will not lead to answering the research questions, then either step should be redone so they match.

Search

In this step, students locate information, use that information to find answers to their pre-research questions, and determine whether or not they have all the information they need. Students can do this by taking notes, giving progress reports, and evaluating the research process.

Notes

Information can be organized by taking notes. These notes should consist of the answers to the research questions. Students can be encouraged to take notes on note cards, leaving room for color-coding. Color-coding the information on the note cards with the same color as the questions they answer will help the student create the paragraphs for the paper. Teachers should monitor students' notes to ensure they are doing them correctly.

Progress Reports

The students should meet regularly to discuss the progress they are making on their research. Difficulty in finding information or other problems they are having can be discussed and solutions can be brainstormed.

Evaluate

During this step, students are asked to decide if they have answered their research questions or not. They may be missing information or they may have gathered enough. Teachers can help students by going over with them the status of their research up to this point.

Interpret

After students have gathered data, they need to interpret what they have before they can put it in a report. This step consists of evaluating, analyzing, and synthesizing the information to use in the report. Students will be able to use creative thinking to bring interest to sometimes sterile facts. Interpreting the data can be done as a class, in small groups, or in a meeting with the teacher.

Evaluate

Students should be taught to question the accuracy and credibility of the information they have gathered. They should examine the source of the information for being the most up to date, the most knowledgeable, and for the level of bias common to that writer or publisher. "All information has inherent biases because of time, politics, culture, or available knowledge. The key is to recognize the biases and determine their effect" (Duffield, 1998, p. 69).

The following are questions teachers can use to help guide their students in this process:

- When was the information written?
- Have things changed since then?
- Who wrote the information?
- Are they fair, impartial experts?
- Do they use words that make you think that they are on one side of an issue?
- Do they seem to know enough about the subject?
- Where did they learn about it?
- Can you believe them? (Duffield, 1998, p. 70)

Analyze

In analyzing the information, the student tries to understand it and tries to be aware of the personal belief system of both writer and reader. The following are suggested questions:

- Do your sources disagree?
- If they don't, can you find someone who does disagree?
- If they do disagree, what are their disagreements?

- What is the basis for their disagreements?
- Is it based on beliefs, values or accurate/ inaccurate information?
- Can you see their point of view? (Duffield, 1998, p. 70)

Synthesize

"Synthesizing the information gives it meaning and makes it useful. Synthesis is an attempt to look for patterns, causes and connections, and to develop theories and hypothesis from them" (Duffield, 1998, p. 69). Students should be able to answer the following questions:

- Does your information fit together?
- Can you find patterns and connections in your information?
- Does your information help you identify causes?
- What theories or hypotheses can you develop based on your information?
- Can you resolve the differences between your sources? (Duffield, 1998, p. 70)

Report

Based on the guidelines set up in the Presearch stage, student will organize the information in a meaningful way. In the K-W-L system, a student's report consists of what they have Learned. Students should be encouraged to write a rough draft for their paper and leave room for editing. They should ask themselves if they have answered the questions they posed in the Presearch stage and if they have answered the questions on their semantic maps. Remind them that paragraphs need to make sense and should be checked for correct capitalization, punctuation, spelling, complete sentences, and good form. If appropriate, bibliographies and artistic covers for the report should be included. The final step in the process could be sharing the report with the class.

Conclusion

Students can best learn about conducting research by having clear-cut guidelines, being shown how to perform each step from start to finish, having the opportunity to conference with peers and teachers on their progress, and having each step broken down into smaller more manageable tasks. This paper examined the steps of Presearch, Search, Interpret, and Report in an effort to help teachers encourage and support students in learning how to conduct research.

If a teacher is looking for a more expressive approach to doing research, the following ideas might better suit these needs:

- Have students create their own blank sketch book/journals.
- Create a class project such as charting the lunar cycles.
- Instruct students to record in their journals any field notes, random reflections, observations, ideas for poems and stories, dialogue snippets, favorite quotes, or artwork that comes to mind in their quest to understand their subject (Rester-Zodrow, G. & Chancer, J., 1997).
- To help students sharpen their observation skills, install a birdfeeder where students will be able to observe the eating patterns of the birds.
- Have students record their observations and share them with the class.
- Let students read about the birds they are observing and encourage them to create theories that explain some of the phenomenon they are seeing (Whitin, D.J. & Whitin, P.E., 1996).

Internet Resources

*Information Skills: Resources on the Internet, From School Libraries Online
http://www.iasl-slo.org/infoskills.html
This is an excellent, annotated collection of sites offering research methods and techniques appropriate for K-12 students.

*The Big 6
http://www.big6.com
Developed by Mike Eisenberg and Bob Berkowitz, the Big6 is the most widely-known and widely-used approach to teaching information and technology skills in the world. Used in thousands of K-12 schools, higher education institutions, and corporate and adult training programs, the Big6 information problem-solving model is applicable whenever people need and use information. The Big6 integrates information search and use skills along with technology tools in a systematic process to find, use, apply, and evaluate information to specific needs and tasks.

*Research Skills
http://academic.alliant.edu/bainbridge/resources/researchskills.htm
Introduces a step-by-step research strategy for students. Includes how to select a research topic, how to use resources, including web and digital databases, and how to develop the research based on what has been found.

*Effective research techniques can enhance student use of Internet resources
http://www.macul.org/newsletter/2000/nov2000/out.html

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